

Marine Habitat Survey 129 Riverview Road, Avalon Beach

Prepared For: Copley Marine Consulting Group
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H2O Consulting Group Pty Ltd

PO Box 3257, Erina NSW 2250
Email: info@h2oconsultinggroup.com.au
Web: <https://h2oconsultinggroup.com.au>
Ph: 0414 848 105

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Background

H2O Ecology was engaged by Copley Marine Consulting Group to provide a Marine Habitat Survey of the seabed and surrounding marine habitat at 129 Riverview Road, Avalon Beach. The property adjoins Pittwater and falls within the Local Government Area of the Northern Beaches.

The purpose of the Marine Habitat Survey is to support a development application for construction of a Jetty, ramp and pontoon at the above address. Under Part 4 of the *Environmental Planning and Assessment Act 1979*, NSW Department of Primary Industries (NSW DPI) is a 'determining authority' for integrated developments such as this, where there is potential that marine vegetation may be harmed.

In NSW, the *Fisheries Management Act 1994* (FM Act) provides conservation and protection of fisheries resources, fish habitat and threatened aquatic species in NSW waters. Under the FM Act as well as the New South Wales *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) there are requirements for the protection of estuarine vegetation such as mangroves, saltmarsh and seagrass.

NSW DPI may make further assessment, evaluations and recommendation that may include stipulating additional mitigation measures as a consent condition for the proposed development after review of this report.

This survey at 129 Riverview Road, Avalon Beach has been conducted in accordance with the *Policy and Guidelines for Fish Habitat Conservation and Management* (Fairfull 2013).

Objectives

The objectives of this Marine Habitat Survey are to:

- Provide a clear description of the proposal, marine environment including presence of threatened and/or invasive species and any relevant hydrological features.
- Where present identify, describe (species & density) and map marine vegetation in the area effected and adjacent areas.
- Identify potential impacts from the proposed development and where appropriate recommend mitigation measures to ameliorate any environmental effects on the marine environment.

Regional Context

Pittwater Estuary (hereafter Pittwater) is a drowned valley estuary north of Sydney that adjoins Broken Bay at the mouth of the Hawkesbury River. The estuary is approximately 10 km in length and 1 km in width with a catchment of 50 km² (WBM 2006). It includes McCarrs Creek, which is the main tributary and a number of water access only communities that include Scotland Island and areas along the western shore. The subject site is located along the eastern shore of Pittwater at Avalon Beach (Figure 1).

The nearest protected aquatic habitat is the Barrenjoey Head Aquatic Reserved located on the southern side of Broken Bay, which is approximately 5 km from the subject site (Figure 1). There are no aquaculture activities, including priority oyster areas within the vicinity of the subject site (NSW DPI 2014).

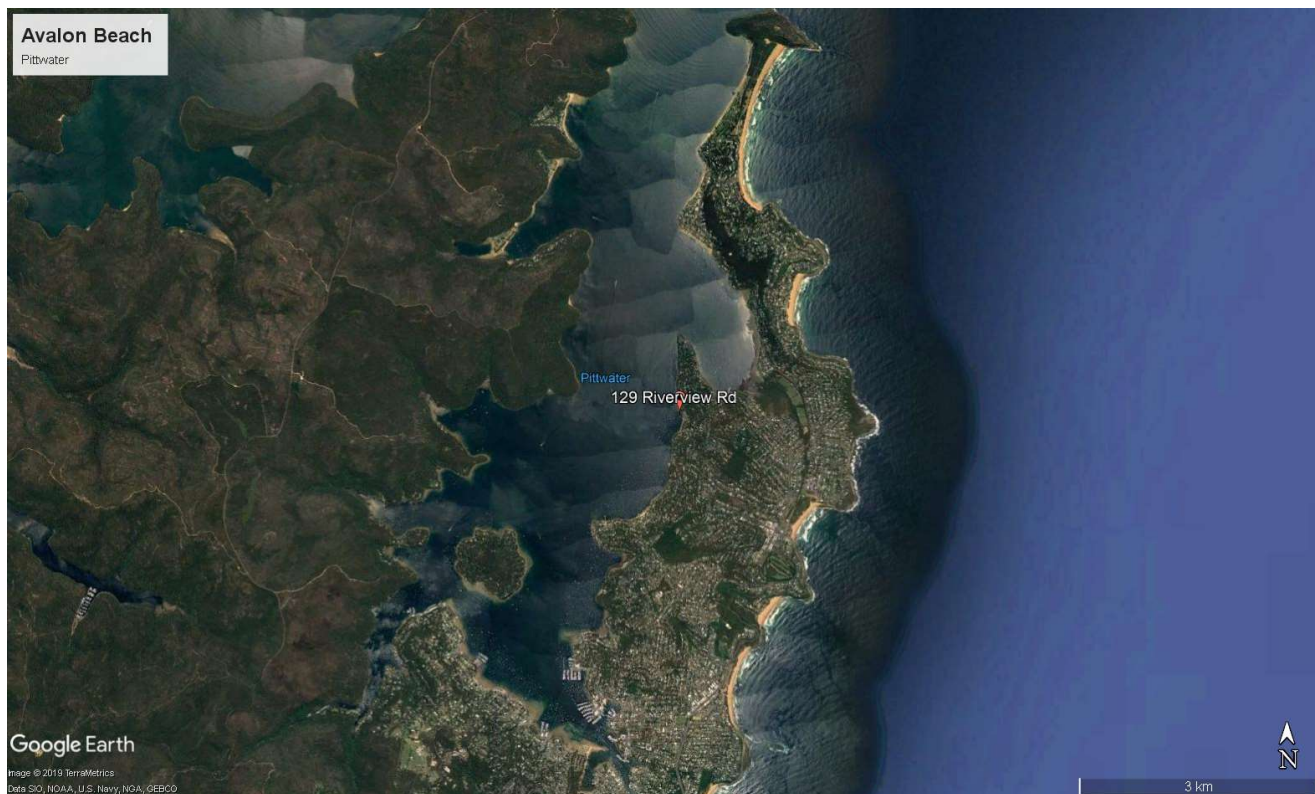


Figure 1: Locality of the proposed development in Pittwater.

Existing Information

Mangroves, saltmarsh and seagrasses are common and important to estuarine productivity and ecological function in Pittwater. Extensive development of the surrounding catchment and accommodation of over 3000 moorings has had a significant impact on aquatic vegetation, especially seagrass beds in Pittwater (WBM 2006). Controlling developments, urban storm water runoff and streamline erosion in the upper catchment remain key management actions in preserving the aquatic environment in Pittwater (Pittwater Council 2005).

NSW DPI habitat maps indicate the presence of seagrasses *Posidonia australis*, *Zostera capricorni* and *Halophila ovalis*, mangroves and saltmarsh communities in Pittwater (Creese *et al.* 2009). In six NSW estuaries including Pittwater, *P. australis* has been listed as an Endangered Population and added to Threatened Species Schedules under the FM Act (NSW DPI 2012a), while *P. australis* seagrass meadows of the Manning-Hawkesbury ecoregion have been listed as Endangered Ecological Community under the EPBC Act. Coastal Saltmarsh has also been listed as an Endangered Ecological Community on the NSW North Coast, Sydney Basin and South East Corner Bioregions under the BC Act, which also corresponds with the listing of Subtropical and Temperate Coastal Saltmarsh as a Vulnerable Ecological Community under the EPBC Act. Previous estuarine habitat mapping done by NSW DPI indicates that widespread

beds of the endangered seagrass population in Pittwater of *P. australis* occur seaward of the subject site (Figure 2).

Along the Sydney coastline and associated deep-water estuaries black rock cod (*Epinephelus daemeli*) may utilise deeper shoreline areas along rocky drop-offs where ledges, overhangs and caves occur. The black rock cod has been listed as a Vulnerable fish species under the FM Act as they have been historically over harvested, and risks remain from fishing, climate change and water pollution (NSW DPI 2012b). More recently white's seahorse (*Hippocampus whitei*) has been listed as an Endangered species under the FM Act. The natural habitats of the white's seahorse include sponge gardens, seagrass meadows and soft corals, while it is also known to use artificial habitats such as protective swimming net enclosures and jetty pylons (NSWS DPI 2019a).

The Pittwater State of the Environment Report (Pittwater Council 2005) indicates the management and control of the spread of the invasive green alga *Caulerpa taxifolia* as a significant ecological issue for aquatic habitats within Pittwater. *Caulerpa taxifolia* is a fast growing alga endemic to tropical waters of Australia that has rapidly colonised areas outside its natural range including within Pittwater. Mapping done in Pittwater by NSW DPI indicates that *C. taxifolia* is widespread along the eastern shore, and has been previously recorded to the south of the subject site (NSW DPI 2015).

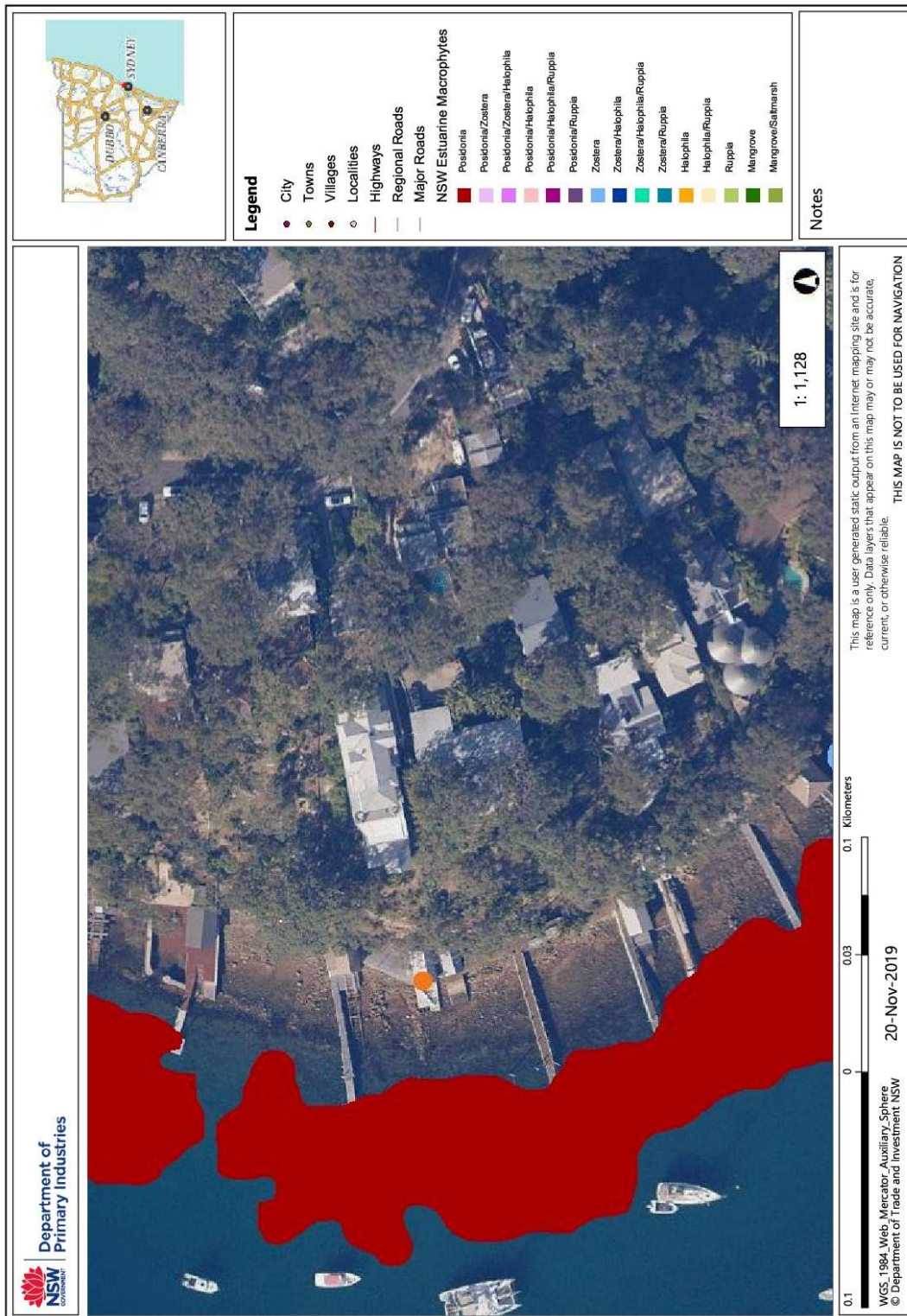


Figure 2: NSW DPI Fisheries mapping in the vicinity of the subject site (Source: NSW DPI 2019b).

● Subject site

Description of the Proposed Development

The proposed works include the following:

- ❖ construction of a jetty (18.5 x 1.2 m);
- ❖ construction of a ramp (6 x 1.2 m); and
- ❖ installation of a pontoon (3.6 x 2.4 m) with two supporting pylons and brackets.

The structure is proposed adjacent (and on the northern side) of an existing boatshed ramp at the subject site (Figure 3 and 4).



Figure 3: Location proposed for the additional waterfront structures adjacent to the existing boatshed ramp.

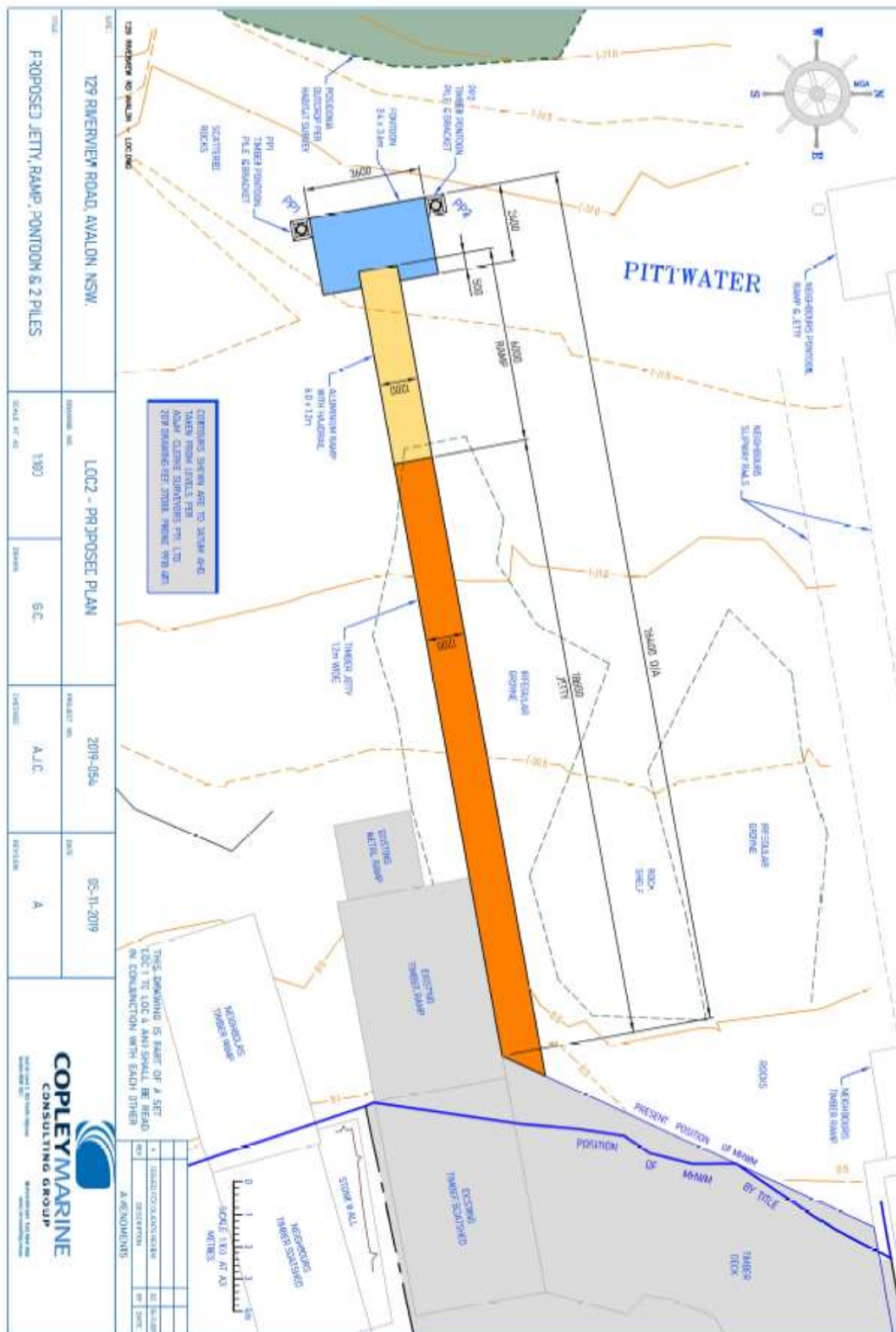


Figure 4: Existing and proposed waterfront structures at the subject site.

Study Methods

The site survey was undertaken at 1200 hrs on the 29th August 2019 near the bottom of the ebb tide. Tidal predictions for nearby Careel Bay on the day was a 0.3 m low tide at 1304 hrs. Weather conditions were overcast with showers and strong south-westerly winds. The water at the subject site was turbid nearshore with visibility as little as 0.5 m while it increased to 2 m in areas further from the shore.

The survey area was along the waterfront of the subject site and extended approximately 40 m from the shore. The area surveyed included all marine habitat within 10 m of the proposed works. The survey was conducted by inspection from the shore and in the water using snorkelling equipment. A combination of GPS positions and measurements taken with a survey tape was used to record data on the position of features of interest. Marine habitat and features of interest were photographed using an underwater digital camera. Marine habitat was described based on dominant flora and fauna observed. For seagrass habitat, density (abundance) and patchiness (sociability) was estimated using categories for each seagrass species present as per King and Barclay (1986) (See Table 1).

Table 1: Seagrass categories for density and patchiness developed from King and Barclay 1986.

Density	
Low	Sparse growth, up to 15% cover
Medium	Moderate growth 15 – 50% cover
High	Abundant growth greater than 50% cover
Patchiness	
Clumps	Individual strands or clumps (less than 1 m ²)
Patches	Patches of between 1 and 5 m ²
Beds	An area of relatively continuous seagrass greater than 5 m ²

Data obtained during the site survey along with aerial imagery was used to develop habitat maps for the study area.

Survey Results

The adjoining shoreline rises steeply to the ridgeline to the east. There is an existing boatshed and ramp on the subject site. Intertidal rocks at the subject site also appear to form old irregular rock groyne. The subject site also includes a stone seawall approximately 1 m in height along the shoreline that prevents shoreline erosion at the subject site. Numerous waterfront structures similar to that proposed were also observed along the waterfront to the north and south of the subject site (Figure 5).

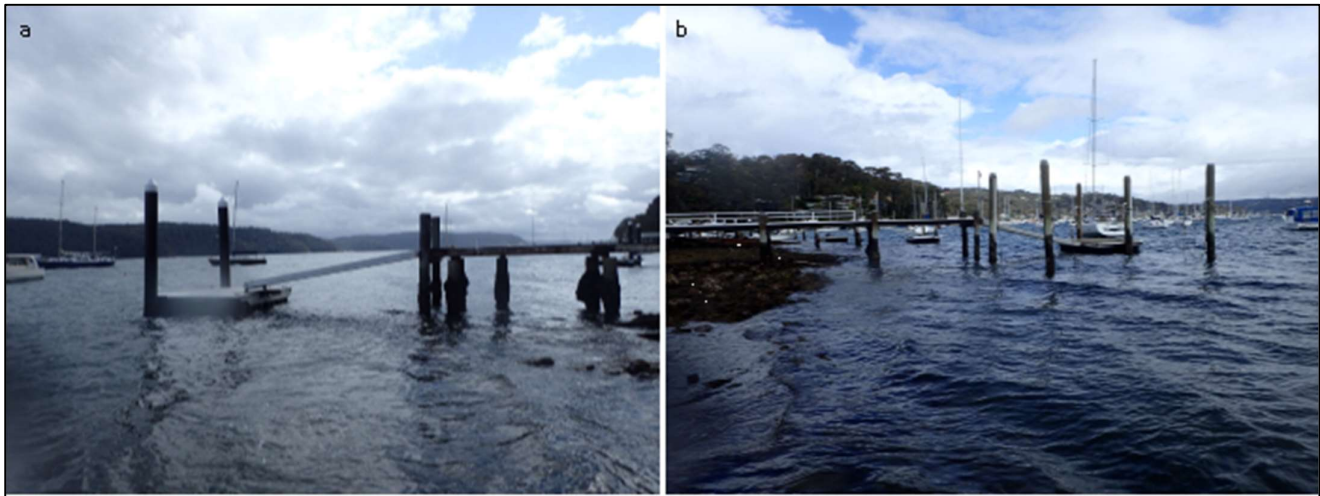


Figure 5: Waterfront structures to the (a) north and (b) south of the subject site.

Intertidal Habitat

The Intertidal zone consisted of a mixture of rock shelf, rubble and ballast rock. This rocky intertidal area extended between 10 and 15 m from the shoreline and formed an irregular groyne adjacent to the existing ramp and along the alignment of the proposed jetty (Figure 6). Habitat was dominated by Sydney rock oysters (*Saccostrea glomerata*), periwinkles (*Bembicium nanum*, *Austrocochlea porcata* and *Nodilittorina unifasciata*), oyster limpets (*Patelloida mimula*), mulberry whelks (*Morula marginalba*), black nerites (*Nerita atramentosa*).

In lower areas a dense cover of the common brown macroalga *Hormosira banksii* smothered areas of rock and rubble. Some small patches of the common green alga *Ulva* sp. were also present in the intertidal area. No other intertidal vegetation was observed.



Figure 6: Typical rocky intertidal habitat forming an irregular rock groyne, looking (a) from the water's edge, (b) and the shore.

Subtidal Habitat

The subtidal habitat consisted of predominately rocky and rubble substrate that continued from the intertidal zone in areas nearest to the shore. The habitat was gradually sloping to approximately the -2 m contour. This habitat was dominated by common brown macroalgae *Sargassum* sp. and *Padina elegans* (Figure 7). Amongst the predominately rocky habitat some isolated and small accumulations of shallow sands were noted between some rocks. In these areas some small low-density isolated patches of *Posidonia australis* seagrass occurred (Figure 8). In places the *P. australis* was growing mixed with another seagrass species *Zostera capricorni* and amongst macroalgae (Figure 7), while in most places these patches consisted of one or two plants of *P. australis* growing amongst the rock and macroalgae dominated habitat (Figure 9).

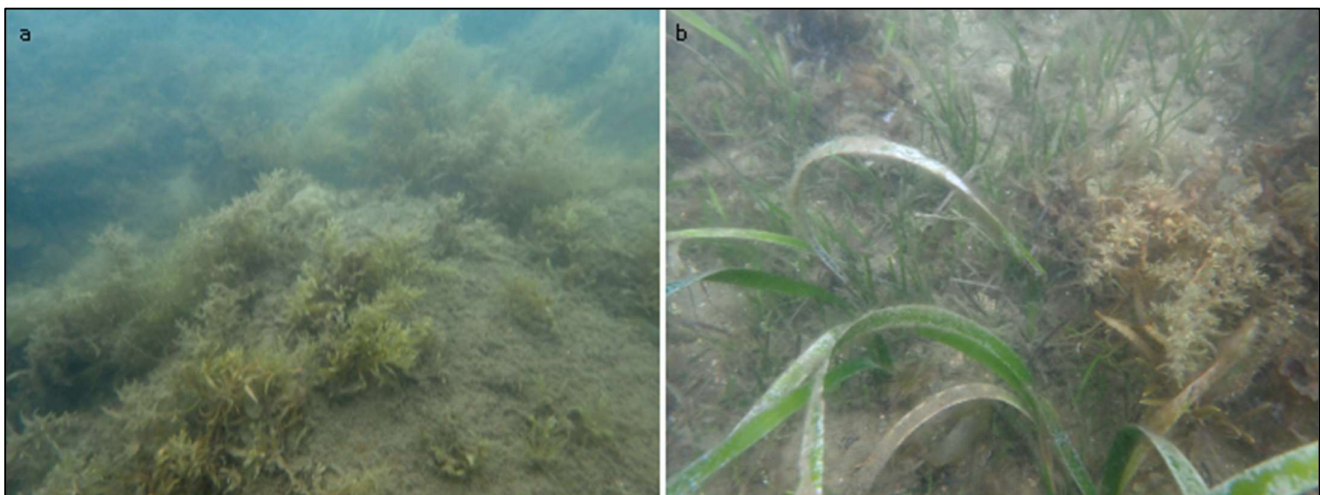


Figure 7: Subtidal habitat of (a) typical rocky macroalgae dominated habitat (b) and low density scattered occurrences of seagrasses growing in soft sediments amongst rocks and macroalgae, within the study area.



Figure 8: Map of benthic habitat showing seagrass in the study area

In areas further from the shore and around the -2 m contour the rocky substrate was dominated by larger boulders and cover of macroalgae decreased. Beyond the -2 m contour the rocky habitat began to become broken with sandy soft sediment patches increasing. At approximately the -3 m depth contour and at approximately 30 m from the shore a patchy bed of low to medium density *P. australis* was found (Figure 9), which appeared to be following this contour in areas adjacent to the shoreline.

The long-spined sea urchin (*Centrostephanus rodgersii*) was observed amongst the larger rocky boulders. While the fishes yellow fin bream (*Acanthopagrus australis*), luderick (*Girella tricuspidata*), eastern hula fish (*Trachinops taeniatus*) and crimson wrasse (*Notolabrus gymnogenis*) were also recorded.

Threatened Species

The Endangered Ecological Community of Coastal Saltmarsh does not occur in the study area.

The Endangered Population in Pittwater of *Posidonia australis* seagrass occurs in this area. The majority of *P. australis* is confined to a larger bed approximately 3 to 5 m seaward of the proposal (Figure 8), where it is growing in medium density (Figure 9). Some small and very low-density patches of *P. australis* restricted to areas where sediment had accumulated between the rocks were also found in closer proximity to the structure, which were as close as 1 to 2 m to the proposal footprint in places (Figure 8). The majority of these small isolated patches typically consisted of 2 or 3 individual *P. australis* plants (Figure 9).

The study area did not include any important habitat for the Vulnerable black rockcod (*Epinephelus daemeli*) as it lacked suitable drops-offs, ledges, overhangs or caves. Furthermore, the proposed works have minimal potential to pose a threat to this species.

The Endangered white's seahorse (*Hippocampus whitei*) was not observed during the survey, however could occupy nearby seagrass habitat or artificial structure provided by pylons for nearby waterfront structures.

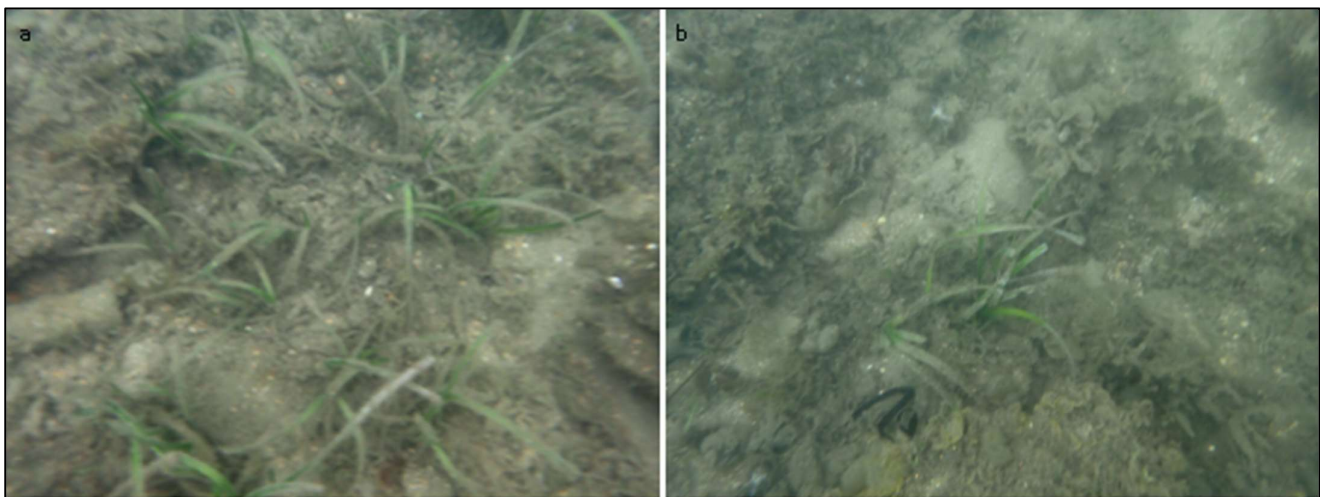


Figure 9: The seagrass *Posidonia australis* growing (a) in low to medium density (b) and amongst rocky areas in isolated occurrences of 2 to 3 plants.

Invasive Species

The invasive green alga *Caulerpa taxifolia* was observed in low density and of patchy occurrence throughout subtidal areas of the study area. It was typically noted to be growing in low density and amongst seagrasses where soft sediments occurred (Figure 10).

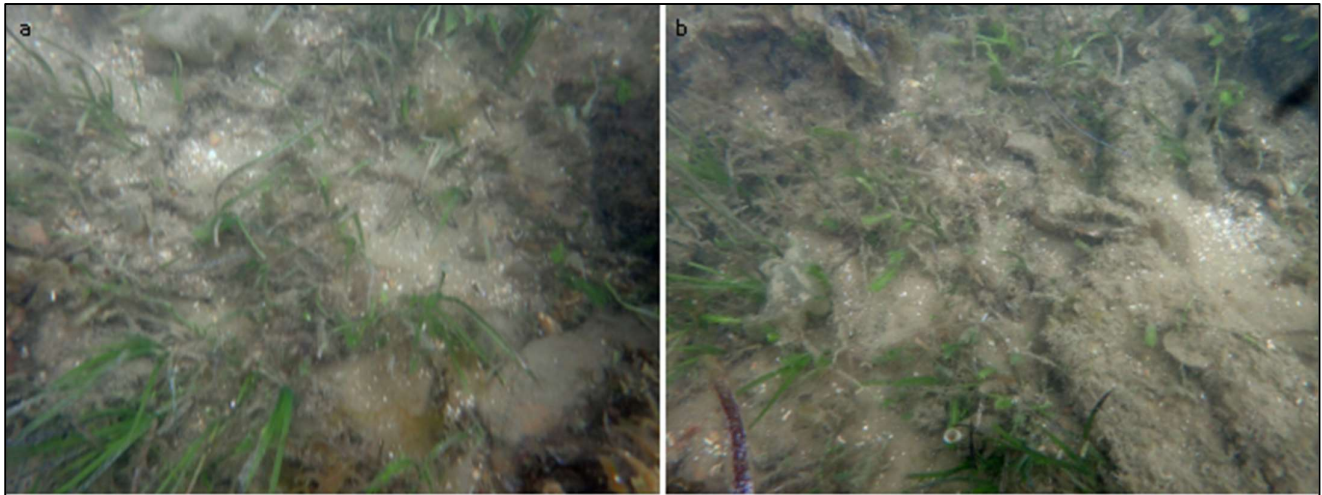


Figure 10: The invasive green alga *Caulerpa taxifolia* growing amongst seagrasses in the study area.

Conclusions and Recommendations

Effects on the aquatic habitat from the proposed structures are likely to include:

- Potential for short term increases in turbidity during installation of jetty footings and pylons. This impact is expected be minimal with very localised and short-term disturbances of water quality, which will likely dissipate quickly with the normal tidal regime.
- Increased potential for siltation on nearby habitats during construction works with potential to mobilise sediments. Nearby habitats include seagrasses, which are more sensitive to sedimentation. The sedimentation generated from this proposal is expected to be minimal and can be further mitigated with the use of silt curtains.
- Disturbance of intertidal habitat during installation of the jetty piers and shading from the jetty. Intertidal habitat within the proposal footprint is confined to a rocky shoreline with species that commonly occur within the locality and are considered less sensitive to shading impacts.
- Disturbance of subtidal habitat during installation of the jetty piers, pylons and shading from the structure. Subtidal habitat within the proposal footprint is confined to rocky subtidal habitat with common macroalgae species which are considered less sensitive to shading impacts. Seagrasses occur nearby but are not expected to be directly shaded by the structure. The potential for any indirect shading of seagrasses can be further minimised through the use of flow-through mesh in subtidal areas.
- Disturbance of seagrass beds by vessels on approach and departure from the structure. The majority of seagrass at the subject site is confined to areas of deeper water around the -3 m depth contour, which is unlikely to be disturbed by vessel props.
- Creation of artificial habitat from the permanent presence of in-water structures. This may increase fish presence and provide additional substrate for sessile invertebrates and cryptic fish species. Given the presence of numerous nearby structures it is expected that these structures would be colonized by biota similar to that found on the nearby structures.

The proposed development is unlikely to have any impacts on any threatened marine species. The Endangered Seagrass Population in Pittwater of *Posidonia australis* does occur in the study area but is not within the proposal footprint and the majority is 3 m or greater beyond the proposal footprint. There is also minimal potential from this proposal to impact on any other threatened species of fish, sharks and marine mammals, which are typically only likely to be transient visitors to the site at times. However, the Endangered white's seahorse (*Hippocampus whitei*) is known to utilise artificial habitat and may utilise habitat provided by the pylons associated with this structure in the future.

Impacted habitat from the proposal is confined to a typically rocky intertidal and subtidal area of marine habitat. This habitat is dominated by common brown macroalgae, which will likely persist under and colonise subtidal areas of any new structures.

The invasive green alga *Caulerpa taxifolia* was observed in the study area, construction works have the potential to facilitate the spread of this and other invasive species. During construction measures to minimise the potential to introduce and spread this species to new locations will be required.

There is potential that construction works as part of this proposal could impact on marine habitat. To manage these potential impacts during construction the following safeguards are recommended for adoption:

- Silt curtains should be put in place to minimise siltation on nearby habitats during works with potential to mobilise sediments.
- All construction works should be done without excavation and by driving piles to minimise potential disturbance to the seabed.
- No construction works including the storing of materials, disturbance of the seabed, mooring or beaching of construction vessels within 1 m of any known seagrass.
- Construction equipment should be washed down and thoroughly cleaned prior to de-mobilisation from the site
- All materials, debris and rubbish should be removed from the site at the end of construction works.

In summary, the proposal utilises a footprint over an old irregular rock groyne to avoid more sensitive seagrasses, and as such there is minimal potential for ecologically significant impacts on aquatic habitat at the subject site from the proposed structure. The adoption of measures identified in this report can also minimise and mitigate any further potential impacts on aquatic habitat.

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